



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: BR700-710D5-21 BYPASS RATIO (-): 4.6  
 UNIQUE ID NUMBER: 01P20BR015 PRESSURE RATIO  $\pi_{co}$  (-): 33.1  
 COMBUSTOR: Phase5 Tiled  
 ENGINE TYPE: MTF RATED OUTPUT  $F_{oo}$  (kN): 68.4

### REGULATORY DATA

CHARACTERISTIC VALUES:	$LTO_{mass}/F_{oo}$ (mg/kN)	$LTO_{num}/F_{oo}$ (particles/kN)	NVPM MASS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
LTO/ $F_{oo}$ AND MAX nvPM <sub>mass</sub>	745.1	9.44E+15	434
AS % OF CAEP/10 LIMIT	-	-	5.3
AS % OF CAEP/11 LIMIT (InP)	23.5	49.7	
AS % OF CAEP/11 LIMIT (NT)	95.8	100.8	

### MEASURED DATA

MODE	POWER SETTING (% $F_{oo}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM <sub>mass</sub> ( $\mu\text{g}/\text{m}^3$ )
				EI <sub>mass</sub> (mg/kg)	EI <sub>num</sub> (particles/kg)	
TAKE-OFF	100	0.7	0.682	63.3	3.13E+14	
CLIMB OUT	85	2.2	0.564	81.4	6.36E+14	
APPROACH	30	4.0	0.197	114.8	1.57E+15	
IDLE	7	26.0	0.080	188.2	2.69E+15	
LTO TOTAL (kg, mg, number of particles)			275	36683	4.65E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ $F_{oo}$ VALUES (mg/kN, particles/kN)				536.0	6.79E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				188.2	2.69E+15	337

\* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

### DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% $F_{oo}$ )	CORRECTED EMISSIONS INDICES	
		EI <sub>mass_SL</sub> (mg/kg)	EI <sub>num_SL</sub> (particles/kg)
TAKE-OFF	100	69.2	4.91E+14
CLIMB OUT	85	90.9	1.09E+15
APPROACH	30	132.1	3.02E+15
IDLE	7	217.3	5.23E+15

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	101.2	102.0	HEAT OF COMBUSTION (MJ/kg)	43.36
TEMPERATURE (K)	283.9	287.8	HYDROGEN CONTENT (%mass)	13.98
HUMIDITY (kg water/kg dry air)	0.0054	0.0078	AROMATICS CONTENT (%vol)	15.5
			NAPHTHALENE CONTENT (%vol)	0.35
			SULPHUR CONTENT (ppm by mass)	10

MANUFACTURER: Rolls-Royce Deutschland  
 TEST ORGANIZATION: Rolls-Royce Deutschland  
 TEST LOCATION: Dahlewitz  
 TEST DATES: 29/03/2017-30/03/2017

### REMARKS

1. Certification Report EDNS01000564837 Issue 4
2. Corrected peak EI number value (fuel correction) since EEDB v30